

## Generalized Average Stocking Rates

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Each piece of grassland can withstand grazing to a certain biological level before negative effects occur. This biological level varies slightly with amount of annual precipitation, ecological condition of the grassland, and type of grazing system used. Moving cattle from a pasture only when all the aboveground herbage has been removed is not a sound management practice. To manage grasslands properly, the producer must know the number of cows that can be grazed on a grassland unit for a specified length of time. This number is termed the stocking rate.

Stocking rate is commonly stated as acres per animal unit month (AUM) or its reciprocal, AUM's per acre. An animal unit month (AUM) is the amount of dry forage one mature cow of approximately 1,000 pounds with a calf requires for one month.

Forage dry matter intake of grazing animals is affected by the size of the cow. Large cows consume more forage than medium- and standard-sized cows. A more accurate estimate of daily or monthly forage demand of livestock on grazinglands can be determined with the metabolic weight of the animal than with its live weight. Metabolic weight is live weight to the 0.75 power. A 1000-pound cow with a calf is the standard, which is defined as 1.00 animal unit (AU) and has a daily dry matter allocation of 26 pounds of pasture forage. The metabolic weight of a 1200-pound cow with a calf is 1.147 animal unit equivalent (AUE), which has a daily dry matter allocation of 30 pounds of pasture forage. The metabolic weight of a 1400-pound cow with a calf is 1.287 animal unit equivalent (AUE), which has a daily dry matter allocation of 33 pounds of pasture forage. The amount of forage dry matter consumed in one month by one animal unit, a 1000-pound cow with a calf, is an animal unit month (AUM). The daily dry matter allocation for a cow with a calf on pasture is different from the daily dry matter requirement for just the cow during the same production periods.

Determining stocking rate for a parcel of grassland by using range site identification and range condition assessment is a complex, time-consuming process. Most grassland managers have not had and

most likely will not have a detailed range stocking rate evaluation completed for their land. However, completion of some level of stocking rate evaluation is an essential step in the development of a pasture and forage inventory. This report summarizes the long-term generalized stocking rate levels for three landscape site management units in the Drift Prairie, Missouri Coteau, and West River Regions of the Northern Plains (tables 1-3). The three landscape site categories are lowland, upland, and xeric landscape sites. The areas of each landscape site that are located in the three different physiographic regions have slightly different average stocking rates. The average stocking rates of the three landscape sites are highly variable with changes in ecological range condition.

The stocking rate estimates in this report assume that the grasslands are managed by seasonlong grazing for 4.5 to 5.0 months, June to October. If the grasslands are managed by 6-month seasonlong grazing from mid May to mid November, the manager can expect the stocking rate to be 140% of the acres/AUM rate for the 4.5- to 5.0-month seasonlong strategy. If the seasonlong grazing is started earlier than mid May and/or continued later than mid November, the manager can expect the stocking rate to be 200% or more of the acres/AUM rate for the 4.5- to 5.0-month seasonlong strategy.

The manager using a grazing system can expect stocking rates higher than 4.5- to 5.0-month seasonlong stocking rates (Manske 1995). The manager using the deferred grazing system, on which grazing is delayed until after grass seed development, can expect the deferred pasture to support a stocking rate about 80% of the acres/AUM rate supported by a 4.5- to 5.0-month seasonlong grazing strategy during the first 4 to 6 years. The manager using the short duration grazing system can expect the stocking rate to be 75% of the acres/AUM rate supported by a 4.5- to 5.0-month seasonlong grazing strategy. The manager using the twice-over rotation grazing system can expect the stocking rate to be 70% of the acres/AUM rate supported by a 4.5- to 5.0-month seasonlong grazing strategy. A long-term, well-managed twice-over grazing system can support a

stocking rate about 55% of the acres/AUM rate of a 4.5- to 5.0-month seasonlong grazing strategy.

The mean average stocking rates for the Drift Prairie, Missouri Coteau, and West River Regions' lowland landscape sites of the good and fair condition categories are 1.10, 1.25, and 1.60 acres/AUM, respectively, and the mean for the three regions is 1.30 acres/AUM. The mean average stocking rates for the Drift Prairie, Missouri Coteau, and West River Regions' upland landscape sites of the good and fair condition categories are 1.75, 2.10 and 2.50 acres/AUM, respectively, and the mean for the three regions is 2.10 acres/AUM. The mean average stocking rates for the the Drift Prairie, Missouri Coteau, and West River Regions' xeric landscape sites of the good and fair condition categories are 2.90, 3.65, and 5.00 acres/AUM, respectively, and the mean for the three regions is 3.85 acres/AUM.

Much of the Northern Plains' native rangeland has been grazed by domesticated livestock for over 100 years. Knowledge of a grassland parcel's historical use is very valuable for determining the future stocking rates of the biologically effective pasture and forage management strategies. Determining the historical stocking rates for a parcel of grassland is not difficult. The only information needed is the average number of days grazed and the number of cow-calf pairs grazed during the recent past.

The first step is to convert the average number of days to average length in months by dividing by 30.5, the average number of days in the average grazing season month (Manske 1998b). The next step is to determine the number of average animal unit months (AUM's) of grazing. Each cow-calf pair is an animal unit. The number of animal units (AU) multiplied by the number of months (M) will give the average total number of AUM's for that parcel of grassland. If the cows are larger than 1,000 pounds, the animal units should be converted to animal unit equivalents (AUE). The current method used to convert AU to AUE is based on the metabolic weight of the animals. The AUE values for various live weights can be found on tables 1 and 2 of Manske 1998a.

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## Literature Cited

- Manske, L.L. 1995.** Economic returns as affected by grazing strategies. NDSU Dickinson Research Extension Center. Range Research Report DREC 95-1012. Dickinson, ND. 20p.
- Manske, L.L. 1998a.** Animal unit equivalent for beef cattle based on metabolic weight. NDSU Dickinson Research Extension Center. Range Management Report DREC 98-1020. Dickinson, ND. 3p.
- Manske, L.L. 1998b.** How long is the average grazing season month? NDSU Dickinson Research Extension Center. Range Management Report DREC 98-1021. Dickinson, ND. 2p.

Table 1. Generalized average stocking rates for 1000 lb cows (1.00 AUE) for the Drift Prairie (A), Missouri Coteau (B), and West River (C) Regions of the Northern Plains.

Stocking Rate in Acres/AUM (1000lb cow=1.00 AUE)												
Landscape Units	Range Condition Category											
	Excellent			Good			Fair			Poor		
	A	B	C	A	B	C	A	B	C	A	B	C
Lowland Landscape Sites	0.75	0.75	1.00	1.00	1.00	1.25	1.25	1.50	2.00	2.50	2.75	3.50
Upland Landscape Sites	1.00	1.25	1.50	1.50	1.75	2.00	2.00	2.50	3.00	4.00	5.00	6.00
Xeric Landscape Sites	1.75	2.25	3.00	2.25	3.00	4.00	3.50	4.25	6.00	7.00	8.00	11.00

  

Stocking Rate in AUM's/Acre (1000lb cow=1.00 AUE)												
Landscape Units	Range Condition Category											
	Excellent			Good			Fair			Poor		
	A	B	C	A	B	C	A	B	C	A	B	C
Lowland Landscape Sites	1.33	1.33	1.00	1.00	1.00	0.80	0.80	0.67	0.50	0.40	0.36	0.29
Upland Landscape Sites	1.00	0.80	0.67	0.67	0.57	0.50	0.50	0.40	0.33	0.25	0.20	0.17
Xeric Landscape Sites	0.57	0.44	0.33	0.44	0.33	0.25	0.29	0.24	0.17	0.14	0.13	0.09

Table 2. Generalized average stocking rates for 1200 lb cows (1.147 AUE) for the Drift Prairie (A), Missouri Coteau (B), and West River (C) Regions of the Northern Plains.

Stocking Rate in Acres/AUM (1200lb cow=1.147 AUE)												
Landscape Units	Range Condition Category											
	Excellent			Good			Fair			Poor		
	A	B	C	A	B	C	A	B	C	A	B	C
Lowland Landscape Sites	0.86	0.86	1.15	1.15	1.15	1.43	1.43	1.72	2.29	2.87	3.15	4.00
Upland Landscape Sites	1.15	1.43	1.72	1.72	2.00	2.29	2.29	2.87	3.44	4.59	5.74	6.88
Xeric Landscape Sites	2.00	2.58	3.44	2.58	3.44	4.59	4.00	4.87	6.88	8.03	9.18	12.62

  

Stocking Rate in AUM's/Acre (1200lb cow=1.147 AUE)												
Landscape Units	Range Condition Category											
	Excellent			Good			Fair			Poor		
	A	B	C	A	B	C	A	B	C	A	B	C
Lowland Landscape Sites	1.16	1.16	0.87	0.87	0.87	0.70	0.70	0.58	0.44	0.35	0.32	0.25
Upland Landscape Sites	0.87	0.70	0.58	0.58	0.50	0.44	0.44	0.35	0.29	0.22	0.17	0.15
Xeric Landscape Sites	0.50	0.39	0.29	0.39	0.29	0.22	0.25	0.21	0.15	0.12	0.11	0.08

Table 3. Generalized average stocking rates for 1400 lb cows (1.287 AUE) for the Drift Prairie (A), Missouri Coteau (B), and West River (C) Regions of the Northern Plains.

Stocking Rate in Acres/AUM (1400lb cow=1.287 AUE)												
Range Condition Category												
Landscape Units	Excellent			Good			Fair			Poor		
	A	B	C	A	B	C	A	B	C	A	B	C
Lowland Landscape Sites	0.97	0.97	1.29	1.29	1.29	1.61	1.61	1.93	2.57	3.22	3.54	4.50
Upland Landscape Sites	1.29	1.61	1.93	1.93	2.25	2.57	2.57	3.22	3.86	5.15	6.44	7.72
Xeric Landscape Sites	2.25	2.90	3.86	2.90	3.86	5.15	4.50	5.47	7.72	9.00	10.30	14.16

  

Stocking Rate in AUM's/Acre (1400lb cow=1.287 AUE)												
Range Condition Category												
Landscape Units	Excellent			Good			Fair			Poor		
	A	B	C	A	B	C	A	B	C	A	B	C
Lowland Landscape Sites	1.03	1.03	0.78	0.78	0.78	0.62	0.62	0.52	0.39	0.31	0.28	0.22
Upland Landscape Sites	0.78	0.62	0.52	0.52	0.44	0.39	0.39	0.31	0.26	0.19	0.16	0.13
Xeric Landscape Sites	0.44	0.34	0.26	0.34	0.26	0.19	0.22	0.18	0.13	0.11	0.10	0.07

To illustrate how to determine the historical stocking rate of a ranch, we will use an example of a pasture of one section (640 acres) that has usually been grazed from 1 June to 15 October by 70 cow-calf pairs with the cow average weight at 1,000 pounds. The average historical stocking rate can be determined by a few easy steps.

1. Determine the grazing season length in months.

number of days in total grazing season	÷	average number of days in grazing season months	=	number of months in grazing season
137 days	÷	30.5 d	=	4.5 M

2. Determine the number of animal units (AU).

Number of cow-calf pairs	X	animal unit equivalents	=	Animal units (AU)
70 c-c prs	X	1.0 AUE	=	70 AU

3. Determine the total number of animal unit months (AUM's).

Animal units (AU)	X	number of months	=	animal unit months (AUM's)
70 AU	X	4.5 M	=	314 AUM's

4a. Determine the average stocking rate in acres/AUM.

Pasture size in acres	÷	number of animal unit months	=	acres per AUM
640 acres	÷	314 AUM's	=	2.04 ac/AUM

4b. Determine the average stocking rate in AUM's/acre.

Animal unit months	÷	pasture acres	=	AUM's per acre
314 AUM's	÷	640 acres	=	0.49 AUM's/ac

If the cows' average weight is heavier than 1,300 pounds, the procedure is as follows:

1. Determine the grazing season length in months.

Use the same procedure as with 1,000-pound cows.

2. Determine the number of animal units (AU).

Number of cow-calf pairs	X	animal unit equivalents	=	Animal units (AU)
70 c-c prs	X	1.25AUE	=	87.5 AU

3. Determine the total number of animal unit months (AUMs).

Animal units (AU)	X	number of months	=	animal unit months (AUM's)
87.5 AU	X	4.5 M	=	394 AUM's

- 4a. Determine the average stocking rate in acres/AUM.

Pasture size in acres	÷	number of animal unit months	=	acres per AUM
640 acres	÷	394 AUM	=	1.62 ac/AUM

Three stocking rates for a parcel of grassland can serve as guidelines for the development of 12-month pasture and forage management strategies.

The mean average upland landscape sites' stocking rate is 2.10 acres per AUM.

The historical stocking rate for 1,000-pound cows is 2.04 acres per AUM.

The historical stocking rate for 1,300-pound cows is 1.62 acres per AUM.

These three stocking rate values should be evaluated in relation to the condition of the grassland parcel. If the historical stocking rate is greater than the average stocking rate and the condition of the grassland is low good or fair, the producer should consider a change in grazing management system and/or stocking rate.